FCC 96-223

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	WT Docket No. 95-70
Amendment of Parts 22, 90, and 94	)	RM-8200
of the Commission's Rules to Permit	)	
Routine Use of Signal Boosters	)	

REPORT AND ORDER

Adopted: May 16, 1996 **Released: June 5, 1996**

By the Commission:

I. INTRODUCTION

1. On June 22, 1995, the Commission released a *Notice of Proposed Rule Making*[1] *(Notice)* in the above-captioned proceeding proposing to expand the use of signal boosters in Part 22[2] common carrier 931-932 MHz paging operations, Part 90[3] land mobile radio and paging operations, and Part 94[4] multiple address system (MAS) operations[5]. This *Report and Order* adopts rules concerning the use of signal boosters substantially as proposed.

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[1] WT Docket No. 95-70, 10 FCC Rcd 6681 (1995).

[2] 47 C.F.R. Part 22.

[3] 47 C.F.R. Part 90.

[4] On February 29, 1996, the Commission released a *Report and Order*, WT Docket No. 94-148, FCC 96-51, incorporating Part 94 (Private Operational Fixed Microwave Service) rules into a new 47 C.F.R. Part 101. Because the new rule part does not become effective until August 1, 1996, and to be consistent with the *Notice* and caption in this proceeding, discussions of private multiple address systems herein refer to Part 94 of the Rules. The rules adopted for the use of signal boosters by private multiple address licensees, however, have a Part 101 designation.

[5] Multiple address systems are point-to-multipoint systems with a base station operating in conjunction with at least four remote stations.

II. EXECUTIVE SUMMARY

2. The Commission adopted a *Notice* proposing to expand the use of signal boosters under Parts 22 and 90 and allow signal booster use under Part 94 for MAS operations. This *Report and Order* allows licensees to use signal boosters on Part 22 paging frequencies at 931-932 MHz and the VHF one-way public paging channels, on Part 90 private land mobile and paging frequencies above 150 MHz, and on Part 94 MAS frequencies at 928-960 MHz. It establishes a 5 watt effective radiated power limit, and allows licensees to use signal boosters to provide fill-in signal coverage without a separate authorization. These actions allow licensees to improve radio system efficiency at less cost and without imposing an additional licensing burden on either the licensee or the Commission.

III. BACKGROUND

3. Signal boosters are low-power transmitters used to improve communications in locations within the normal coverage area of a radio system where the radio signal is blocked or shielded due to natural terrain or man-made obstacles (*e.g.*, to provide fill-in coverage but not increase the normal coverage area).[6] Under Part 22, a form of signal booster, generally called a cellular repeater, may be employed by cellular licensees without separate licensing provided that the repeater does not extend the licensee's signal beyond the authorized cellular service area.[7] Under Part 90, signal boosters may be used only on ten Business Radio Service frequency pairs in the 450-470 MHz band for communications related to the servicing and supplying of aircraft at certain specified airports.[8] Part 94 does not contain provisions for the use of signal boosters.

4. The *Notice* proposed to allow licensees to use signal boosters on Part 22 paging frequencies at 931-932 MHz, on all Part 90 land mobile and paging frequencies above 150 MHz, and on Part 94 MAS frequencies in the 928-960 MHz band. Additionally, the *Notice* proposed (1) to define and classify signal boosters as either Class A narrowband[9] or

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[6] Examples where signal boosters may be employed include valleys, tunnels, below-ground parking facilities and inside large cargo vessels and aircraft hangers.

[7] *See* 47 C.F.R. § 22.165.

[8] *See* 47 C.F.R. § 90.75(c)(25). Waivers have also been granted to permit other Part 90 licensees to use signal boosters

[9] Class A narrowband signal boosters amplify only those discrete frequencies intended to be retransmitted.

Class B broadband[10] , (2) to limit signal booster transmitter output power to 500 milliwatts (mW), (3) to permit licensees to use signal boosters without separate authorization from the Commission, and (4) to require licensees to correct any interference caused by their use of signal boosters. Nineteen comments and six reply comments were filed in response to the *Notice*. A list of commenters is provided in Appendix A.

IV. DISCUSSION

Expanded use of signal boosters.

5. Proposal. In the *Notice,* we proposed to expand the use of signal boosters (1) to Part 22 paging operations at 931-932 MHz, (2) to Part 90 land mobile and paging operations in the frequency bands above 150 MHz, and (3) to Part 94 MAS operations in the 928-960 MHz band. Under our proposal, signal boosters could not extend the transmitted signal beyond a licensee's established service area. We asked for comments, however, on whether to allow "booster/translator" devices, devices which could extend a licensee's service area.[11]

6. Comments. The vast majority of the commenters support our proposals to allow expanded use of signal boosters. Commenters agree that signal boosters can be effective in weak or no-signal areas that may be present in a licensee's area of operation and that a signal booster should not extend the signal beyond a station's normal coverage area.[12]

7. Several commenters address the use of signal boosters in specific cases. SpaceLabs Medical Inc. (SpaceLabs) and Hewlett Packard Company (HP) oppose signal booster use in the Part 90, 450-470 MHz band. They contend that signal boosters operating in this band could cause harmful interference to medical telemetry operations.[13] Both argue that medical telemetry equipment, such as used by hospitals for cardiac patient care, would be subject to interference by uncontrolled signal booster use. They state that hospitals select 450-470 MHz frequencies after an extensive search of the database to find low-interference potential frequencies, and that interference to the sensitive medical telemetry receivers could disrupt the electrocardiogram signal, putting the patient at risk. SpaceLabs suggests that

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[10] Class B broadband signal boosters amplify all frequencies within the booster's passband.

[11] A booster/translator requires different input and output frequencies. It is functionally the same as a mobile relay or repeater station, but operates at a much lower transmitting power level.

[12] *See*, for example. Comments of ATG at 1, Andrews at 2, Arch/AirTouch at 2, Celwave at 3, Motorola at 2, TIA at 1, UTC at 3, PageNet at 2, and PCIA at 3.

[13] Comments of SpaceLabs at 1, and HP at 1.

licensees proposing to use signal boosters notify and receive concurrence from all healthcare facilities in the licensee's operating area.[14] TX RX Systems, Inc. (TX RX) replies that the potential of harmful interference by signal boosters to medical telemetry is overstated.[15] UTC, The Telecommunications Association (UTC) also claims that there is no need to restrict signal booster use in the 450 MHz band. UTC states that "manufacturers of medical telemetry equipment should not be allowed to hold the entire 450-470 MHz band hostage simply due to the extreme sensitivity of their very low power devices."[16]

8. TX RX and others suggest that the use of signal boosters in Part 22 should be expanded further to include the VHF one-way public paging channels.[17] Blooston, Mordkofsky, Jackson, and Dickens (BMJ&D) and Paging Network, Inc. (PageNet) state that there is a potential conflict between two of our proposals and the rules governing Part 22, 931 MHz paging operations.[18] They note that under the Commission's proposal, Part 22 paging licensees must locate signal boosters within the protected service area of the licensee's authorized base transmitter with which the boosters are associated and that signal boosters cannot extend a Part 22 licensee's service area. They point out, however, that Section 22.537 of the rules currently specifies a minimum service radius of 32.2 kilometers (20 miles) and a minimum distance for the interfering contour of 80 kilometers (50 miles) for each 931 MHz transmitter regardless of the power and antenna height employed.[19] Thus, the 20-mile and 50-mile distances would apply to signal boosters. They argue that the effect of this would be to severely limit signal booster application at the outer portions of a station's service area, which is usually the place signal boosters are needed most. No comments were received concerning our proposals on signal booster use by Part 94 MAS licensees.

9. The only comments addressing the booster/translator issue were filed by the American Petroleum Institute (API) and Celwave, a division of Radio Frequency Systems, Inc. (Celwave). API contends that there may be cases where a booster/translator may be superior to a signal booster, but that because a second frequency would be required, booster/translators, if allowed, should be coordinated and licensed.[20] Celwave argues that

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[14] Comments of SpaceLabs at 6-8.

[15] Reply Comments of TX RX at 5.

[16] Reply Comments of UTC at 5-6.

[17] Comments of TX RX at 5, Blooston, Mordkofsky, Jackson, and Dickens (BMJ&D) at 3, and Telecommunications Industries Association (TIA) at 2.

[18] Comments of BMJ&D at 4-5 and Paging Network, Inc. (PageNet) at 2-3.

[19] 47 C.F.R. §22.537

[20] Comments of API at 5.

booster/translators are intended primarily to extend coverage areas and offer no advantage over Class A or B boosters.[21]

10. Discussion. Based on the comments, we are adopting rules allowing the use of signal boosters (1) on Part 22 paging frequencies at 931-932 MHz, (2) on Part 90 land mobile and paging frequencies above 150 MHz, and (3) on Part 94 MAS frequencies at 928-960 MHz. Allowing the use of signal boosters will increase flexibility and provide licensees a more cost effective method of improving system coverage. We also believe there is merit to expanding the use of signal boosters to VHF public paging channels under Part 22 as requested by several commenters. We find no valid reason to deny licensees of VHF public paging systems, which operate similar to Part 22, 931 MHz paging systems, the use of signal boosters to fill in poor coverage areas. Licensees utilizing signal boosters will be responsible for correcting harmful interference caused by their use.[22]

11. We do not find SpaceLabs' or HP's arguments opposing signal booster use in the Part 90, 450-470 MHz band persuasive. Medical telemetry equipment in this frequency band currently operates in a shared environment.[23] Consequently, a low-power base station operating co-channel with a medical telemetry device, or a high-power base station on an adjacent channel 12.5 kHz removed, could be licensed at any time in the same geographic area as the medical telemetry equipment. The interference potential of low-power signal boosters to medical telemetry devices is typically less than from other authorized stations.

12. In regard to the issue raised by BMJ&D and PageNet, it was not our intent to restrict the use of signal boosters operating on Part 22, 931 MHz paging frequencies by applying the service and interference contours specified in Section 22.537. To eliminate this conflict, we are adopting service radii for signal boosters operating with an antenna height above average terrain not exceeding 30 meters (98 feet). The radii are as follows: for the service contour, 1 kilometer (0.6 miles) and for the interfering contour, 10 kilometers (6.2 miles). These radii are consistent with a conservative application of the Okumura

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[21] Comments of Celwave at 2.

[22] As indicated in the *Notice* at note 8, the reception of normal co-channel transmissions on shared frequencies in the same geographic area will not be considered as harmful interference. Generally, all licensees must cooperate in resolving interference problems pursuant to the provisions of 47 C.F.R. § 90.173(b).

[23] The medical telemetry devices in question operate on a secondary basis on offset frequencies in the 450-470 MHz band. Operation on these offset frequencies is limited to two watts. *See* 47 C.F.R. § 90.267.

900 MHz propagation curves,[24] using the correction for suburban areas[25] and the correction for rolling, hilly terrain with a terrain roughness factor of $\Delta h \approx 50$ meters.[26]

13. We believe that we should adopt the rule establishing the smaller contour radii for signal boosters operating on 931 MHz channels without further notice. The need for additional flexibility in determining 931 MHz service and interfering contours for smaller facilities is documented in the record.[27] We also believe that the rule establishing smaller contour radii for signal boosters is a logical outgrowth of our proposals concerning signal boosters generally.[28] Finally, if we were to allow the use of signal boosters as desired by most of the parties, but not make this allowance, 931 MHz paging licensees' use of signal boosters would be so severely limited that the one of the main goals for this rule making proceeding, namely to establish reasonable regulations under which signal boosters may be used with 931 MHz paging stations, would not be met.

14. In the *Notice,*[29] we declined to propose allowing booster/translators to extend a station's coverage area, but asked for comments on whether there may be situations where a booster/translator may be superior to a signal booster to provide better coverage within the licensee's coverage area. The only comment offering any support for booster/translators was API and its support was based on these devices being coordinated and licensed. Because booster/translators could increase a licensee's service area, coordination and licensing would seem to be in order. One of our goals in this proceeding, however, was to allow increased flexibility without increasing the regulatory burden (*e.g.*, separate licensing) on either the licensee or the Commission. Therefore, we decline to adopt rules permitting the use of booster/translators.

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[24] *See* Y. Okumura *et al.*, "Field strength and its variability in VHF and UHF land-mobile radio service," *Rev. Elec. Commun. Lab.*, vol.16, pp 825-873, 1968. The 900 MHz propagation curves are shown as Fig. 41(c) on page 865. The curves are based on a mobile receive antenna height of 1.5 meters above ground, which seems appropriate for paging receivers.

[25] *Id.*, Figure 20 on page 845.

[26] *Id.* at Figure 28(b) on page 851.

[27] Comments of Arch/Airtouch at 3-4, 9-10 and n.16; and Comments of BMJ&D at 4-5.

[28] *See International Harvester v. Ruckelhouse*, 478 F.2d, 615, 632, & n. 51 (D.C. Cir. 1973) (an agency can make rules responding to comments without embarking on a new round of comments). *See generally* Small Refiner Lead Phase-Down Task Force v. EPA, 705 F.2d 506, 546-547 (D.C. Cir. 1983) and cases cited therein.

[29] *Notice* at ¶ 10.

Class B Boosters

15. Proposal. We proposed in the *Notice* to allow both Class A narrowband and Class B broadband boosters.

16. Comments. Several commenters express concern about the potential for interference from Class B broadband signal boosters. Nextel Communications, Inc (Nextel) argues that because Part 90 Specialized Mobile Radio (SMR) trunked radio systems operating in the 806-821/851-866 MHz band do not use contiguous channels,[30] the use of a Class B broadband booster in this frequency band would boost not only the licensee's authorized frequencies, but all the other frequencies within the range of the Class B broadband booster.[31] Similarly, American Mobile Telecommunications Association, Inc. (AMTA), Geotek Communications, Inc. (Geotek) and Personal Communications Industry Association (PCIA), contend that there is a significant risk of interference if Class B broadband signal boosters are permitted to be used in the services where amplified channels may be assigned to different licensees.[32] To avoid such interference, Nextel suggests that the SMR industry only employ Class A narrowband boosters,[33] AMTA suggests keeping signal booster power to 500 mW,[34] Geotek proposes restricting Class B broadband signal booster use to confined areas,[35] and PCIA asks that we consider the impact of Class B broadband signal boosters in areas where adjacent channel signals may be amplified.[36] HP argues that Class B broadband boosters should be prohibited in the 450-470 MHz band.[37]

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[30] Transmitting frequencies in a trunked group in the 806-821/851-866 MHz band are not contiguous but rather separated by one megahertz. In this band there are 39 frequencies that lie between each frequency in a trunked group authorized to a particular licensee. This means that for a typical 5-channel trunked group there are 156 frequencies between the lowest frequency and the highest frequency being boosted that are not assigned to the licensee. Any of these frequencies could be assigned to other licensees in the same area.

[31] Comments of Nextel at 3-4.

[32] Comments of AMTA at 1, Geotek at 3, and PCIA at 4-6.

[33] Comments of Nextel at 4.

[34] Comments of AMTA at 6.

[35] Comments of Geotek at 3.

[36] Comments of PCIA at 4.

[37] Comments of HP at 2-3.

17. Decision. As noted in the comments, Class B broadband boosters raise additional interference concerns. These devices amplify all signals within the design passband, including signals on frequencies that may not be authorized to the licensee. Nevertheless, the comments contend there is a need for Class B broadband boosters. Therefore, rather than prohibit their use, we will restrict use of Class B broadband boosters under Parts 22, 90 and 94 to areas that are confined or enclosed such as tunnels, underground parking garages, and within buildings (*i.e.*, areas where there is little or no risk of interference to others). This provision, along with the requirement that licensees must correct any interference caused by signal boosters, should alleviate interference concerns about the use of Class B broadband signal boosters.

Power limit.

18. Proposal. In the *Notice*, we proposed that the total power output of a signal booster be limited to 500 mW. Thus, the maximum authorized power output of a Class A narrowband signal booster would be 500 mW, and the output power per channel of a Class B broadband signal booster would be determined by dividing the signal booster power (up to 500 mW) by the number of authorized frequencies (channels) that the signal booster is re-transmitting. Our rationale in the *Notice* for proposing a maximum 500 mW power level was that this power level would approximate the effective radiated power of most hand-held portable units, and would be adequate for the intended purpose of signal fill-in, while still being sufficiently restrictive to minimize interference to other users.[38] Further, Part 90 rules currently specify a 500 mW maximum power output level for 450 MHz signal boosters that may be used at airports.[39]

19. Comments. Most commenters addressing the issue of signal booster power argue that the proposed power limits are too restrictive.[40] Motorola, Inc. (Motorola) for example, suggests a 5 watt output power limit.[41] TIA and Celwave recommend that the effective radiated power (ERP) rather than the output power of signal boosters be limited, as ERP has a greater bearing on the interference potential of a booster. TIA notes that a large range of ERPs may result from the use of an output power of 500 mW with a variety of antennas. Both TIA and Celwave suggest that ERP be limited to 5 watts per channel.[42] TX RX states

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[38] *Notice* at ¶ 8.

[39] *Notice* at ¶ 8 and n. 10.

[40] Comments of Andrew at 5, ATG at 1, API at 5, Arch/AirTouch at 7, Celwave at 3-6, Motorola at 3, RAM Mobile Data USA (RMD) at 3-5 (comments on 900 MHz SMRs), TIA at 3, TX RX at 6-14, and UTC at 3.

[41] Comments of Motorola at 4.

[42] Comments of TIA at 4 and Celwave at 3-4.

that there should not be any limit on signal booster power other than the maximum power limits that normally apply to transmitters. TX RX suggests that the Commission instead require that signal boosters incorporate an output power limiter circuit.[43] TX RX also states that limiting booster power to 500 mW will require a licensee to use more boosters, thus raising the noise "floor" on a channel.[44] Allen Telecomm Group (ATG) recommends authorizing signal booster power up to the base station's authorized power upon a showing of need.[45] Andrew Corporation (Andrew) recommends that a Class B signal booster be limited to 500 mW per "r.f. channel", rather than to total output power.[46] Arch Communications Group, Inc and AirTouch Paging (Arch/Airtouch) support the comments of Andrew.[47] AMTA, SkyTel Corp. (SkyTel), and Nextel support the proposed 500 mW output power limit.[48]

20. Decision. Our goal is to allow licensees sufficient power to provide fill-in coverage, without increasing a station's normal coverage area or the potential for interference. After analysis of the comments, we conclude that a power level higher than 500 mW would be more appropriate. We also conclude that specifying booster power in terms of ERP rather than output power would be the most effective way of minimizing interference. We are adopting a maximum signal booster output power level of 5 watts ERP per channel as recommended by a majority of the commenters. This will give licensees additional flexibility to meet their communications requirements without substantially increasing the interference potential.[49] Class A narrowband signal boosters will be limited to 5 watts ERP, and Class B broadband boosters to 5 watts ERP for each authorized frequency that the booster is designed

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[43] Comments of TX RX at 6-15.

[44] Reply Comments of TX RX at 3-4. Raising the noise level or "floor" in a channel degrades channel voice quality.

[45] Comments of ATG at 2.

[46] Comments of Andrew at 5.

[47] Comments of Arch/AirTouch at 7.

[48] Comments of AMTA at 6 and Reply Comments of SkyTel at 2. Nextel, in Reply Comments at 3, states that a 500 mW power output level would be appropriate for 800 MHz SMR systems.

[49] For example, the higher power will allow licensees to use isolators, filters or other interference-fighting components that they might otherwise not have used under the proposed power level. It will also allow a licensee to use fewer signal boosters to cover a weak or no-signal area.

to amplify.[50]

Licensing requirements.

21. Proposal. In the *Notice*, we proposed to allow licensees to use signal boosters without separate authorizations from the Commission. Licensees would be required to use type accepted equipment and to ensure that all applicable rule requirements are met. The *Notice* stated that because operation of a signal booster would be on frequencies already authorized to a licensee, and that the booster's signal must not extend beyond a station's normal coverage area, there should be little chance for interference to distant co-channel users. Therefore, there seemed to be little justification to create additional burdens for the licensee and the Commission by requiring a licensee to obtain a separate authorization for the operation of a signal booster.

22. Comments. Commenters generally agree that a separate authorization should not be required for signal boosters.[51] Several, however, argue that some type of record is needed to facilitate the solution of interference problems caused by signal booster use. Motorola and UTC, for example, suggest that the licensee be required to keep records of signal booster use.[52] AMTA recommends that the licensee provide the Commission with information such as the licensee's call sign, contact person information, type of booster, and its location.[53] Geotek similarly recommends that a licensee notify the Commission of signal booster class, placement, and basic technical parameters.[54] Nextel recommends a notice requirement for the use of a signal booster in the SMR service to identify the booster in the data base should there be an interference problem.[55] PCIA suggests that an additional letter be added to a licensee's authorized station class if boosters are utilized, that the licensee provide a booster deployment letter to the Commission, and that a copy of the letter be provided to all adjacent channel licensees.[56] Other commenters express concern about the idea that signal boosters

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[50] For example, a Class B broadband booster designed to amplify a 5-channel 800 MHz trunked group would be type accepted with an ERP limit of 25 watts. No single channel, however, could operate at an ERP greater than 5 watts.

[51] *See,* for example, Comments of API at 4, ATG at 1, and TIA at 3.

[52] Comments of Motorola at 4, and UTC at 4-5. UTC also suggests that a booster be required to have an owner's identification label to facilitate locating a booster user.

[53] Comments of AMTA at 8.

[54] Comments of Geotek at 5.

[55] Comments of Nextel at 6 and Reply Comments at 3..

[56] Comments of PCIA at 6.

would be "unlicensed".[57]

23. Decision. The comments have not convinced us that licensees should have to obtain a separate authorization to operate signal boosters. A separate authorization in this case would be both burdensome and unnecessary. As we stated in the *Notice*, signal boosters operate on frequencies already authorized to the licensee and cannot increase the coverage area provided by the licensee's base station, but only fill in weak or no-signal areas. The signal booster's low transmitting power further minimizes the potential for interference. For the same reasons, we see no basis to impose a notification requirement or require licensees to provide us with information on the location and use of signal boosters. In the unlikely case of interference, licensees should check with nearby co-channel and adjacent channel users to determine if such interference is caused by the use of a signal booster. Therefore, we will allow licensees to use signal boosters without a separate authorization. This is consistent with the Commission rules for cellular repeaters under 47 C.F.R § 22.165, and police radar transmitters under 47 C.F.R. § 90.19(g)(6).

V. CONCLUSION

24. In this *Report and Order*, we are adopting rule changes that will permit licensees to use signal boosters on a routine basis, without separate authorization from the Commission, (1) in Part 22 public paging operations, (2) in Part 90 land mobile and paging operations, and (3) in Part 94 MAS operations. We believe this action will further the public interest by enabling licensees to improve radio system efficiency at less cost and without imposing an additional licensing burden on either the licensee or the Commission.

VI. FINAL REGULATORY FLEXIBILITY ANALYSIS

25. Pursuant to the Regulatory Flexibility Act of 1980, the Commission's final analysis is as follows:

Need for and Purpose of this Action

26. This *Report and Order* amends Parts 22, 90, and 101 of the Commission's Rules by establishing certain technical and operational parameters that will permit licensees to routinely use signal boosters without separate authorization from the Commission. This action will reduce the burden on both the licensee and the Commission.

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[57] Comments of Arch/Airtouch at n.4; Reply Comments of Nextel at n.6; and Reply Comments of TX RX at 6.

Issues Raised in Response to the Initial Regulatory Flexibility Analysis

27. None of the commenters addressed the Initial Regulatory Flexibility Analysis.

Significant Alternatives Considered and Rejected

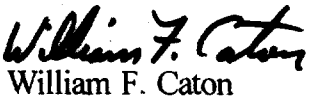
28. The Commission considered all of the alternatives in this proceeding and considered all of the timely filed comments in the *Notice of Proposed Rule Making*. Aside from maintaining the *status quo*, there are no alternatives other than considered in this *Report and Order*.

VII. ORDERING CLAUSES

29. Accordingly, **IT IS ORDERED** that, pursuant to the authority of Sections 4(i), 303(r), and 332(a)(2) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 303(r), and 332(a)(2), Parts 22, 90, and 101 of the Commission's Rules, 47 C.F.R. Parts 22, 90, and 101 **ARE AMENDED** as set forth in the attached Appendix, effective [thirty days after publication in the Federal Register].

30. IT IS FURTHER ORDERED that this proceeding is **TERMINATED**.

FEDERAL COMMUNICATIONS COMMISSION



William F. Caton
Acting Secretary

APPENDIX A

Parties filing comments on *Notice of Proposed Rule Making*, WT Docket No. 95-70:

Allen Telecomm Group (ATG)
American Petroleum Institute (API)
American Mobile Telecommunications Association, Inc. (AMTA)
Andrew Corporation (Andrew)
Arch Communications Group, Inc. (Arch) jointly with
AirTouch Paging (AirTouch)
Blooston, Mordkofsky, Jackson & Dickens (BMJ&D)
Celwave, a division of Radio Frequency Systems, Inc. (Celwave)
Geotek Communications , Inc. (Geotek)
Hewlett-Packard Company (HP)
Mobile and Personal Communications Division, Private Radio Section of
the Telecommunications Industries Association (TIA)
Motorola, Inc. (Motorola)
Nextel Communications, Inc. (Nextel)
Paging Network Inc. (PageNet)
Personal Communications Industry Association (PCIA)
RAM Mobile Data USA Limited Partnership (RMD)
Seiko Communications of America, Inc. (Seiko America)
SpaceLabs Medical, Inc. (SpaceLabs)
TX RX Systems, Inc. (TX RX)
UTC, The Telecommunications Association (UTC)

Parties filing reply comments:

AMTA
Nextel
RAM jointly with Geotek
SkyTel Corp. (SkyTel)
TX RX
UTC

APPENDIX B

Parts 22, 90, and 101 of Chapter I of Title 47 of the Code of Federal Regulations are amended as follows:

PART 22 - PUBLIC MOBILE SERVICES

1. The authority citation for Part 22 continues to read as follows:

Authority: 47 U.S.C. 154, 303, unless otherwise noted.

2. Section 22.99 is amended by adding the definition for "signal booster" in alphabetical order to read as follows:

§ 22.99 Definitions.

* * * * *

Signal booster. A stationary device that automatically reradiates signals from base transmitters without channel translation, for the purpose of improving the reliability of existing service by increasing the signal strength in dead spots.

* * * * *

3. Section 22.377 is amended by revising the first sentence of the introductory text to read as follows:

§ 22.377 Type-acceptance of transmitters.

Except as provided in paragraph (b) of this section, transmitters used in the Public Mobile Services, including those used with signal boosters, in-building radiation systems and cellular repeaters, must be type-accepted for use in the radio services regulated under this part. * * *

* * * * *

4. A new Section 22.527 is added, to read as follows:

§ 22.527 Signal boosters.

Licensees may install and operate signal boosters on channels listed in § 22.531 only in accordance with the provisions of § 22.165 governing additional transmitters for existing systems. Licensees must not allow any signal booster that they operate to cause interference to the service or operation of any other authorized stations or systems.

5. Section 22.535 is amended by revising the introductory text and by adding a new paragraph (f) to read as follows:

§ 22.535 Effective radiated power.

The effective radiated power (ERP) of transmitters operating on the channels listed in § 22.531 must not exceed the limits in this section.

* * * * *

(f) *Signal boosters.* The effective radiated power of signal boosters must not exceed 5 watts ERP under any normal operating condition.

6. Section 22.537 is amended by adding a new paragraph (h) to read as follows:

§ 22.537 Technical channel assignment criteria.

* * * * *

(h) *Signal boosters on 931 MHz channels.* For the purpose of compliance with § 22.165 and notwithstanding paragraphs (e) and (f) of this section, signal boosters operating on the 931 MHz channels with an antenna HAAT not exceeding 30 meters (98 feet) are deemed to have as a service contour a circle with a radius of 1.0 kilometer (0.6 mile) and as an interfering contour a circle with a radius of 10 kilometers (6.2 miles).

PART 90 - PRIVATE LAND MOBILE RADIO SERVICES

7. The authority citation for Part 90 continues to read as follows:

Authority: Sections 4, 303, and 332, 48 Stat. 1066, 1082, as amended: 47 U.S.C.154, 303, and 332, unless otherwise noted.

8. Section 90.7 is amended by revising the definition for "signal booster" to read as follows:

§ 90.7 Definitions.

* * * * *

Signal booster. A device at a fixed location which automatically receives, amplifies, and retransmits on a one-way or two-way basis, the signals received from base, fixed, mobile, and portable stations, with no change in frequency or authorized bandwidth. A signal booster

may be either narrowband (Class A), in which case the booster amplifies only those discrete frequencies intended to be retransmitted, or broadband (Class B), in which case all signals within the passband of the signal booster filter are amplified.

* * * * *

9. Section 90.75(c)(25) is amended by revising the introductory paragraph and paragraphs (i) through (iii), removing paragraphs (iv), (v), (vi), and (vii), and redesignating paragraph (viii) as (iv), to read as follows:

§ **90.75 Business Radio Service.**

* * * * *

(c) ***

(25) This frequency is available for assignment as follows:

(i) To persons furnishing commercial air transportation service or, pursuant to § 90.179, to an entity furnishing radio communications service to persons so engaged, for stations located on or near the airports listed in paragraph (c)(25)(iv) of this section. Stations will be authorized on a primary basis and may be used only in connection with the servicing and supplying of aircraft.

(ii) To stations in the Business Radio Service for secondary use at locations 80 km (50 mi) or more from the coordinates of the listed airports at a maximum ERP of 300 watts.

(iii) To stations in the Business Radio Service for secondary use at locations 16 km (10 mi) or more from the coordinates of the listed airports at a maximum transmitter output power of 2 watts. Use of the frequency is restricted to the confines of an industrial complex or manufacturing yard area. Stations licensed prior to April 17, 1986 may continue to operate with facilities authorized as of that date.

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10. A new Section 90.219 is added to read as follows:

§ **90.219 Use of signal boosters.**

Licensees authorized to operate radio systems in the frequency bands above 150 MHz may employ signal boosters at fixed locations in accordance with the following criteria:

(a) The amplified signal is retransmitted only on the exact frequency(ies) of the originating base, fixed, mobile, or portable station(s). The booster will fill in only weak

signal areas and cannot extend the system's normal signal coverage area.

(b) Class A narrowband signal boosters must be equipped with automatic gain control circuitry which will limit the total effective radiated power (ERP) of the unit to a maximum of 5 watts under all conditions. Class B broadband signal boosters are limited to 5 watts ERP for each authorized frequency that the booster is designed to amplify.

(c) Class A narrowband boosters must meet the out-of-band emission limits of § 90.209 for each narrowband channel that the booster is designed to amplify. Class B broadband signal boosters must meet the emission limits of § 90.209 for frequencies outside of the booster's design passband.

(d) Class B broadband signal boosters are permitted to be used only in confined or indoor areas such as buildings, tunnels, underground areas, etc., *i.e.*, areas where there is little or no risk of interference to other users.

(e) The licensee is given authority to operate signal boosters without separate authorization from the Commission. Type-accepted equipment must be employed and the licensee must ensure that all applicable rule requirements are met.

(f) Licensees employing either Class A narrowband or Class B broadband signal boosters as defined in § 90.7 are responsible for correcting any harmful interference that the equipment may cause to other systems. Normal co-channel transmissions will not be considered as harmful interference. Licensees will be required to resolve interference problems pursuant to § 90.173(b).

PART 101 - FIXED MICROWAVE SERVICES

11. The authority citation for Part 101 reads as follows:

Authority: 47 U.S.C. 154, 303, unless otherwise noted.

12. Section 101.3 is amended by adding the definition for "signal booster" in alphabetical order to read as follows:

§ 101.3 Definitions.

* * * * *

Signal booster. A device at a fixed location which automatically receives, amplifies, and retransmits on a one-way or two-way basis, the signals received from base, fixed, mobile, and portable stations, with no change in frequency or authorized bandwidth. A signal booster may be either narrowband (Class A), in which case the booster amplifies only those discrete

frequencies intended to be retransmitted, or broadband (Class B), in which case all signals within the passband of the signal booster filter are amplified.

* * * * *

13. Section 101.151 is added to read as follows:

§ 101.151 Use of signal boosters.

Private operational-fixed licensees authorized to operate multiple address systems in the 928-929/952-960 MHz and 932-932.5/941-941.5 MHz bands may employ signal boosters at fixed locations in accordance with the following criteria:

(a) The amplified signal is retransmitted only on the exact frequency(ies) of the originating base, fixed, mobile, or portable station(s). The booster will fill in only weak signal areas and cannot extend the system's normal signal coverage area.

(b) Class A narrowband signal boosters must be equipped with automatic gain control circuitry which will limit the total effective radiated power (ERP) of the unit to a maximum of 5 watts under all conditions. Class B broadband signal boosters are limited to 5 watts ERP for each authorized frequency that the booster is designed to amplify.

(c) Class A narrowband boosters must meet the out-of-band emission limits of § 101.111 for each narrowband channel that the booster is designed to amplify. Class B broadband signal boosters must meet the emission limits of § 101.111 for frequencies outside of the booster's design passband.

(d) Class B broadband signal boosters are permitted to be used only in confined or indoor areas such as buildings, tunnels, underground areas, etc., *i.e.*, areas where there is little or no risk of interference to other users.

(e) The licensee is given authority to operate signal boosters without separate authorization from the Commission. Type-accepted equipment must be employed and the licensee must ensure that all applicable rule requirements are met.

(f) Licensees employing either Class A narrowband or Class B broadband signal boosters as defined in § 101.3 are responsible for correcting any harmful interference that the equipment may cause to other systems.